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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XF444

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Pile Driving Activities for the Restoration of Pier 62, Seattle Waterfront, Elliot Bay

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; Issuance of an Incidental Harassment Authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an incidental harassment authorization (IHA) to the Seattle Department of Transportation (Seattle DOT) to incidentally harass, by Level B harassment only, marine mammals during pile driving and removal activities associated with the restoration of Pier 62 project in Seattle Waterfront, Elliot Bay in Seattle, Washington.

DATES: This Authorization is applicable from October 4, 2017 through February 28, 2018.

FOR FURTHER INFORMATION CONTACT: Stephanie Egger, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the applications and supporting documents, as well as a list of the references cited in this document, may be obtained online at www.nmfs.noaa.gov/pr/permits/incidental/construction.htm. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth.

NMFS has defined “negligible impact” in 50 CFR 216.103 as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

The MMPA states that the term “take” means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

Except with respect to certain activities not pertinent here, the MMPA defines “harassment” as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption

of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

National Environmental Policy Act

In compliance with NOAA policy, the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*), and the Council on Environmental Quality Regulations (40 CFR parts 1500-1508), NMFS determined the issuance of the IHA qualifies to be categorically excluded from further NEPA review. This action is consistent with categories of activities identified in CE B4 of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion.

Summary of Request

On January 27, 2017, NMFS received a request from the Seattle DOT for an IHA to take marine mammals incidental to pile driving activities for the restoration of Pier 62, Seattle Waterfront, Elliot Bay in Seattle, Washington. Seattle DOT's request is for take of 11 species of marine mammals, by Level A and Level B harassment. Neither Seattle DOT nor NMFS expect mortality to result from this activity and, therefore, an IHA is appropriate.

This IHA would cover one season of a larger project for which Seattle DOT intends to request take authorization for subsequent facets of the project. The second season of the project is expected to involve pile driving the remainder of piles for Pier 62 and Pier 63.

Description of Specified Activities

Overview

The planned project will replace Pier 62 and make limited modifications to Pier 63 on the Seattle waterfront of Elliot Bay, Seattle, Washington. The existing piers are constructed of creosote-treated timber piles and treated timber decking, which are failing. The planned project would demolish and remove the existing timber piles and decking of Pier 62, and replace them with concrete deck planks, concrete pile caps, and steel piling.

The footprint of Pier 62 will remain as it currently is, with a small amount of additional over-water coverage (approximately 3,200 square feet) created by a new float system added to the south side of Pier 62. This float system is intended for moorage of transient, small-boat traffic, and will not be designed to accommodate mooring or berthing for larger vessels. This includes removing 815 timber piles, and will require installation of 180 steel piles for Pier 62. To offset the additional over-water coverage associated with the new float system, approximately 3,700 square feet of Pier 63 will be removed. This includes removing 65 timber piles, and will require installation of nine steel piles to provide structural support for the remaining portion of Pier 63. Seattle DOT estimates 49 days will be needed to remove the old timber piles and 64 days for installation of steel piles for a total of 113 in-water construction days for both Pier 62 and Pier 63. Pile driving (removal and installation activities) will occur approximately eight hours a day during daylight hours only.

The 14-inch (in) timber piles will be removed with a vibratory hammer or pulled with a clamshell bucket. The 30-in steel piles will be installed with a vibratory hammer to the extent possible. An impact hammer will be used for proofing steel piles or when encountering obstructions or difficult ground conditions. The contractor may elect to operate multiple pile

crews for the Pier 62 Project. As a result, more than one vibratory or impact hammer may be active at the same time. The Seattle DOT will not operate more than two vibratory hammers concurrently. The Seattle DOT will proof 10 piles, spread over the different geological zones and construction zones of the pier foundation. For this proofing effort, one impact crane would be mobilized. In addition to proofing, if a pile reaches refusal (*i.e.*, can be driven no farther) with a vibratory hammer, an impact hammer would be used to drive the pile to the required depth or embedment. It is not possible to anticipate which piles will need to be driven with an impact hammer. Even if the project were to mobilize two impact hammer crews on one day, given the nature of the work, simultaneous hammer strikes would not be possible.

In-water noise from pile driving activities will result in the take, by Level A and Level B harassment only, of 11 species of marine mammals. It is assumed that a second season of in-water pile driving will be required to finish the pile installation. The specific scope of the second season of work will depend on work accomplished during the first season. A separate IHA application will be prepared for the second season of work. In-water work will occur within a modified or shortened work window (October through February) to reduce or minimize effects on juvenile salmonids.

A detailed description of the planned Pier 62 project is provided in the ***Federal Register*** notice for the proposed IHA (82 FR 34486; July 25, 2017). Since that time, no changes have been made to the planned activities. Therefore, a detailed description is not provided here. Please refer to that ***Federal Register*** notice for the description of the specific activity.

Comments and Responses

A notice of NMFS's proposal to issue an IHA to the Seattle DOT for the Pier 62 project was published in the ***Federal Register*** on July 25, 2017 (82 FR 34486). That notice described, in

detail, Seattle DOT's activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals. During the 30-day public comment period, NMFS received only one pertinent comment letter, from the Marine Mammal Commission (Commission).

Comment 1: NMFS received a comment from the Commission and while the Commission agrees with NMFS's determinations, it recommends that NMFS follow NMFS's policy of a 24-hour reset for enumerating the number of marine mammals that could be taken during the planned activities by applying standard rounding rules before summing the numbers of estimated takes across survey sites and survey days.

Response: Calculating predicted take is not an exact science and there are arguments for using different mathematical approaches in different situations, and for making qualitative adjustments in other situations. NMFS is currently engaged in developing a protocol to help guide its take calculations given particular situations and circumstances. We believe, however, that the methodology for this action is appropriate and is not at odds with the 24-hour reset policy the Commission references.

Comment 2: NMFS received comments from the Seattle Aquarium (Aquarium) requesting Seattle DOT coordinate with the Aquarium during pile driving and removal activities for the Aquarium's captive marine mammals, some of which are housed outside of the main aquarium, and may potentially be exposed to sound and visual stimuli during the project. The Aquarium also requested additional mitigation measures during pile driving and removal activities to minimize impacts from noise on the Aquarium's captive marine mammals as well as for air and water quality concerns.

Response: After coordinating with Seattle DOT, NMFS confirmed that additional, voluntary measures will be carried out by the Seattle DOT to satisfy concerns from the Aquarium. Seattle DOT will implement the following:

1. If aquarium animals are determined by the Aquarium veterinarian to be distressed, Seattle DOT will coordinate with Aquarium staff to determine appropriate next steps, which may include suspending pile driving work for 30 minutes, provided that suspension does not pose a safety issue for the Pier 62 project construction crews.
2. Seattle DOT will make reasonable efforts to take at least one regularly scheduled 20-minute break in pile driving each day.
3. Seattle DOT will regularly communicate with the Aquarium staff when pile driving is occurring.
4. Seattle DOT will further coordinate with the Aquarium to determine appropriate methods to avoid and minimize impacts to water quality.
5. Seattle DOT does not anticipate the project resulting in impacts associated with airborne dust. If, during construction, odors associated with the project are an issue, Seattle DOT will coordinate with its contractor to determine appropriate mitigation measures.

Description of Marine Mammals in the Area of Specified Activities

The marine mammal species under NMFS's jurisdiction that have the potential to occur in the construction area include Pacific harbor seal (*Phoca vitulina*), northern elephant seal (*Mirounga angustirostris*), California sea lion (*Zalophus californianus*), Steller sea lion (*Eumetopias jubatus*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), long-beaked common dolphin (*Delphinus capensis*), both southern resident and transient killer whales (*Orcinus orca*), humpback whale (*Megaptera novaengliae*), gray whale

(*Eschrichtius robustus*), and minke whale (*Balaenoptera acutorostrata*) (Table 1). Of these, the southern resident killer whale (SRKW) and humpback whale are protected under the Endangered Species Act (ESA). Pertinent information for each of these species is presented in this document to provide the necessary background to understand their demographics and distribution in the area.

Table 1. Marine Mammal Species Potentially Present in Region of Activity

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N) ¹	Stock abundance (CV, N _{min} , most recent abundance survey) ²	PBR	Annual M/SI ³
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray whale	<i>Eschrichtius robustus</i>	Eastern North Pacific	-; N	20,990 (0.05; 20,125; 2011)	624	132
Family Balaenidae						
Humpback whale	<i>Megaptera novaeangliae novaeangliae</i>	California/Oregon/Washington	E; D	1,918 (0.03; 1,855; 2011)	11.0	≥ 5.5
Minke whale	<i>Balaenoptera acutorostrata scammoni</i>	California/Oregon/Washington	-; N	636 (0.72, 369, 2014)	3.5	≥ 1.3
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Killer whale	<i>Orcinus orca</i>	Eastern North Pacific Offshore	-; N	240 (0.49, 162, 2008)	1.6	0
Killer whale	<i>Orcinus orca</i>	Eastern North Pacific Southern Resident	E; D	78 (na, 78, 2014)	0.14	0
Long-beaked common dolphin	<i>Dephinus capensis</i>	California	-; N	101,305 (0.49; 68,432, 2014)	657	≥35.4
Family Phocoenidae (porpoises)						
Harbor Porpoise	<i>Phocoena phocoena</i>	Washington Inland Waters	-; N	11,233 (0.37; 8,308; 2015)	66	≥7.2
Dall's Porpoise	<i>Phocoenoides dalli</i>	California/Oregon/Washington	-; N	25,750 (0.45, 17,954, 2014)	172	≥0.4
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						

California sea lion	<i>Zalophus californianus</i>	U.S.	-; N	296,750 (na, 153,337, 2011)	9,200	389
Steller sea lion	<i>Eumetopias jubatus</i>	Eastern DPS	-; N	60,131- 74,448 (-; 36,551; 2013)	1,645	Insig.
Family Phocidae (earless seals)						
Harbor seal	<i>Phoca vitulina</i>	Washington Northern Inland Waters stock	-; N	11,036 (0.15, -, 1999)	Undet.	9.8
Northern elephant seal	<i>Mirounga angustirostris</i>	California breeding	-; N	179,000 (na; 81,368, 2010)	4,882	8.8

1 - Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

2- NMFS marine mammal stock assessment reports online at: www.nmfs.noaa.gov/pr/sars/. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance. In some cases, CV is not applicable.

3 - These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (e.g., commercial fisheries, ship strike). Annual mortality/serious injury (M/SI) often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

A detailed description of the of the species likely to be affected by the Pier 62 project, including brief introductions to the species and relevant stocks as well as available information regarding population trends and threats, and information regarding local occurrence, were provided in the ***Federal Register*** notice for the proposed IHA (82 FR 34486; July 25, 2017). Since that time, we are not aware of any changes in the status of these species and stocks; therefore, detailed descriptions are not provided here. Please refer to that ***Federal Register*** notice for these descriptions. Please also refer to NMFS' website (www.nmfs.noaa.gov/pr/species/mammals/) for generalized species accounts.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

The effects of underwater noise from the planned activities for the Pier 62 project have the potential to result in Level B behavioral harassment of marine mammals in the vicinity of the action area. There is also some potential for auditory injury (Level A harassment) to result, primarily for high frequency species, due to larger predicted auditory injury zones. Auditory

injury is unlikely to occur for mid-frequency species and most pinnipeds. The mitigation and monitoring measures (*i.e.*, exclusion zones, use of a bubble curtain, etc. as discussed in detail below in “Mitigation” section), are expected to minimize the severity of such taking to the extent practicable.

The project would not result in permanent impacts to habitats used directly by marine mammals, such as haulout sites, but may have potential short-term impacts to food sources such as marine invertebrates and fish species. Construction will also have temporary effects on salmonids and other fish species in the project area due to disturbance, turbidity, noise, and the potential resuspension of contaminants during the Pier 62 project. The ***Federal Register*** notice for the proposed IHA (82 FR 34486; July 25, 2017) included a detailed discussion of the effects of anthropogenic noise on marine mammals and their habitat, and therefore, that information is not repeated here; please refer to that ***Federal Register*** notice for that information.

Estimated Take

This section provides an estimate of the number of incidental takes to be authorized through this IHA, which informed both NMFS’s consideration of whether the number of takes is “small” and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines “harassment” as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would primarily be by Level B harassment, as exposure to pile driving activities has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to result, primarily for high frequency species due to larger predicted auditory injury zones. Auditory injury is unlikely to occur for mid-frequency species and most pinnipeds. The mitigation and monitoring measures (*i.e.*, exclusion zones, use of a bubble curtain, etc. as discussed in detail below in “Mitigation” section), are expected to minimize the severity of such taking to the extent practicable. Below we describe how the take is estimated.

Described in the most basic way, we estimate take by considering: 1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; 2) the area or volume of water that will be ensonified above these levels in a day; 3) the density or occurrence of marine mammals within these ensonified areas; and, 4) and the number of days of activities. Below, we describe these components in more detail and present the authorized take estimates.

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience,

demography, behavioral context) and can be difficult to predict (Southall *et al.* 2007, Ellison *et al.* 2011). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μ Pa root mean square (rms) for continuous (*e.g.*, vibratory pile-driving, drilling) sources and above 160 dB re 1 μ Pa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources. Seattle DOT's planned activity includes the use of continuous (vibratory pile driving and removal) and impulsive (impact pile driving) sources, and therefore the 120 and 160 dB re 1 μ Pa (rms) are applicable.

Level A harassment for non-explosive sources - NMFS's Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NMFS, 2016a) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). Seattle DOT's planned activity includes the use of continuous (vibratory pile driving and removal) and impulsive (impact pile driving) sources.

These thresholds were developed by compiling and synthesizing the best available science and soliciting input multiple times from both the public and peer reviewers to inform the final product, and are provided in Table 2 below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2016 Technical Guidance, which may be accessed at: <http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm>.

Table 2. Thresholds Identifying the Onset of Permanent Threshold Shift.

Hearing Group	PTS Onset Thresholds	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB
<p>* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.</p> <p>Note: Peak sound pressure (L_{pk}) has a reference value of 1 μPa, and cumulative sound exposure level (LE) has a reference value of 1 μPa²s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript “flat” is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (<i>i.e.</i>, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.</p>		

Ensonified Area

Here, we describe operational and environmental parameters of the activity that fed into identifying the area ensonified above the acoustic thresholds.

Background noise is the sound level that would exist without the planned activity (pile driving and removal, in this case), while ambient sound levels are those without human activity (NOAA 2009). The marine waterway of Elliott Bay is very active, and human factors that may contribute to background noise levels include ship traffic and fishing-boat depth sounders.

Natural actions that contribute to ambient noise include waves, wind, rainfall, current

fluctuations, chemical composition, and biological sound sources (*e.g.*, marine mammals, fish, and shrimp; Carr *et al.* 2006). Background noise levels were compared to the NOAA/NMFS threshold levels designed to protect marine mammals to determine the Level B Harassment Zones for noise sources. Based on work completed by Washington State Department of Transportation (WSDOT) for Washington State Ferries (WSF) to determine background noise in the vicinity of Elliott Bay, specifically at the Seattle Ferry terminal, the background level of 124 dB rms was used to calculate the attenuation for vibratory pile driving and removal (WSDOT 2015b). Although NMFS's harassment threshold is typically 120 dB for continuous noise, based on multiple measurements, the data collected by WSDOT (2015b) indicate that ambient sound levels are typically higher than this sound level and ranged from 124 dB to 141 dB; therefore, we used 124 dB rms as the relevant threshold for the Seattle DOT Pier 62 project, assuming that any noise generated by the project below 124 dB would be subsumed by the existing background noise and have little likelihood of causing additional behavioral disturbance.

The sound source levels for installation of the 30-in steel piles are based on surrogate data compiled by WSDOT. The source level of vibratory removal of 14-in timber piles were based on measurements conducted at the Port Townsend Ferry Terminal during vibratory removal of 12-in timber piles by WSDOT (Laughlin 2011). The recorded source level is 152 decibels (dB) re 1 micropascal (μPa) at 16 meters (m) from the pile. This value was also used for other pile driving projects (*e.g.*, WSDOT Seattle Multimodal Construction Project - Colman Dock (82 FR 31579; July 7, 2017)) in the same area as the Seattle Pier 62 project. In February of 2016, WSDOT conducted a test pile project at Colman Dock and the measured results from that project were used for that project and here to provide source levels for the prediction of isopleths ensonified over thresholds for the Seattle Pier 62 project. The results showed that the sound

pressure level (SPL) root-mean-square (rms) for impact pile driving of 36-in steel pile is 189 dB re 1 μ Pa at 14 m from the pile (WSDOT 2016b). This value is also used for impact driving of the 30-in steel piles, which is a precautionary approach. Source level of vibratory pile driving of 36-in steel piles is based on test pile driving at Port Townsend in 2010 (Laughlin 2011). Recordings of vibratory pile driving were made at a distance of 10 m from the pile. The results show that the SPLrms for vibratory pile driving of 36-in steel pile was 177 dB re 1 μ Pa (WSDOT 2016a).

The method of incidental take requested is Level B acoustical harassment of any marine mammal occurring within the 160 dB rms disturbance threshold during impact pile driving of 30-in pipe piles; the 120 dB rms disturbance threshold for vibratory pile driving of 30-in pipe piles; and the 120 dB rms disturbance threshold for vibratory removal of 14-in timber piles have been established as the three different Level B ZOIs that will be in place during active pile removal or installation of the different types of piles (Table 3). However, measured ambient noise levels in the area are 124 dB; therefore, NMFS only considers take likely to occur in the area ensonified above 124 dB, as pile driving noise below 124 dB would likely be masked or their impacts diminished such that any reactions would not be considered take as a result of the high ambient noise levels.

For the Level B ZOI's, sound waves propagate in all directions when they travel through water until they dissipate to background levels or encounter barriers that absorb or reflect their energy, such as a landmass. Therefore, the area of the Level B ZOIs was determined using land as the boundary on the north, east and south sides of the project. On the west, land was also used to establish the zone for vibratory driving. From Alki on the south and Magnolia on the north, a straight line of transmission was established out to Bainbridge Island. For impact driving (and vibratory removal), sound dissipates much quicker and the impact zone stays within Elliott Bay.

Pile-related construction noise would extend throughout the nearshore and open water environments to just west of Alki Point and a limited distance into the East Waterway of the Lower Duwamish River, a highly industrialized waterway. Because landmasses block in-water construction noise, a “noise shadow” created by Alki Point is expected to be present immediately west of this feature (refer to Seattle DOT’s application for maps depicting the Level B ZOIs).

Table 3. Level B Zone Descriptions and Duration of Activity

Sound Source	Activity	Construction Method	Level B Threshold (m)	Level B ZOI (km²)	Days of Activity
1	Removal of 14-in Timber Piles	Vibratory	1,865	4.9	49
2	Installation of 30-in Steel Piles	Vibratory	54,117	91	53
3	Installation of 30-in Steel Piles	Impact	1,201	2.3	11

When NMFS Technical Guidance (NMFS 2016) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which will result in some degree of overestimate of Level A take. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources such as vibratory and impact pile driving, NMFS’s User Spreadsheet predicts the closest distance at which, if a marine mammal remained at that distance the whole duration of the

activity, it would not incur PTS. Inputs used in the User Spreadsheet, and the resulting isopleths are reported below.

The PTS isopleths were identified for each hearing group for impact and vibratory installation and removal methods that will be used in the Pier 62 Project. The PTS isopleth distances were calculated using the NMFS acoustic threshold calculator (NMFS 2016), with inputs based on measured and surrogate noise measurements taken during the EBSP and from WSDOT, and estimating conservative working durations (Table 4 and Table 5).

Table 4. NMFS Technical Acoustic Guidance User Spreadsheet Input to Predict PTS Isopleths.

USER SPREADSHEET INPUT			
	Sound Source 1	Sound Source 2	Sound Source 3
Spreadsheet Tab Used	A)Vibratory pile driving (removal)	A)Vibratory pile driving (installation)	E.1) Impact pile driving (installation)
Source Level (rms SPL)	155 dB ^a	180 dB ^b	
Source Level (Single Strike/shot SEL)			176 dB ^c
Weighting Factor Adjustment (kHz)	2.5	2.5	2
a) Number of strikes in 1 h			20
a) Activity Duration (h) within 24-h period	8	8	4
Propagation (xLogR)	15	15	15
Distance of source level measurement (meters) ⁺	16	10	14

^a Laughlin, Jim. 2011. Port Townsend Dolphin Timber Pile Removal – Vibratory Pile Monitoring Technical Memorandum. Prepared by Washington State Department of Transportation, Office of Air Quality and Noise, Seattle, Washington. January 2011. 3 dB added for use of two vibratory hammers.

^b Source level for 30-in steel piles was from test pile driving at Port Townsend Ferry Terminal in 2010. SPLrms for vibratory pile driving was 177 dB re 1 µPa. and 3 dB was added for use of two hammers.

^c Source information is from the Underwater Sound Level Report: Colman Dock Test Pile Project 2016.

Table 5. NMFS Technical Acoustic Guidance User Spreadsheet Output for Predicted PTS Isopleths and Level A Daily Ensonified Areas.

USER SPREADSHEET OUTPUT					
	PTS Isopleth (meters)				
Sound Source Type	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
1 - Vibratory (pile removal)	17.4	1.5	25.7	10.6	0.7
2 - Vibratory (installation)	504.8	44.7	746.4	306.8	21.5
3 - Impact (installation)	88.6	3.2	105.6	47.4	3.5
	Daily ensonified area (km ²) ^a				
Vibratory (pile removal)	0.000476	0.000004	0.001037	0.000176	7.70E-13
Vibratory (installation)	0.400275	0.003139	0.875111	0.147853	0.000726
Impact (installation)	0.012331	0.000016	0.017517	0.003529	1.92423E-05

Note:

^a Daily ensonified areas were divided by two to only account for the ensonified area within the water and not over land.

Marine Mammal Occurrence and Take Calculation and Estimation

In this section we provide the information about the presence, density, or group dynamics of marine mammals that informed the take calculation and we describe how the marine mammal occurrence information is brought together to produce a quantitative take estimate. In all cases we demonstrated take estimates using the species density data from the 2015 Pacific Navy Marine Species Density Database (U.S. Navy 2015), to estimate take for marine mammals.

Take estimates are based on average marine mammal density in the project area multiplied by the area size of ensonified zones within which received noise levels exceed certain thresholds (*i.e.*, Level A and B harassment) from specific activities, then multiplied by the total number of days such activities would occur.

Unless otherwise described, incidental take is estimated by the following equation:

Incidental take estimate = species density * zone of influence * days of pile-related activity

However, adjustments were made for nearly every marine mammal species, whenever their local abundance was known through other monitoring efforts. In those cases, the local abundance data was used for take calculations for the authorized take instead of general animal density (see below).

Harbor Seal

Based on U.S. Navy species density estimates (U.S. Navy 2015) for the inland waters of Puget Sound, potential take of harbor seal is shown in Table 6. Based on these calculations, Level A take is estimated at 10 harbor seals from vibratory pile driving and Level B take is estimated at 6,193 harbor seals from all sound sources. However, observational data from previous projects on the Seattle waterfront have documented only a fraction of what is calculated using the Navy density estimates for Puget Sound. For example, between zero and seven seals were observed daily for the EBSP and 56 harbor seals were observed over 10 days in the area with the maximum number of 13 harbor seals sighted during the 2016 Seattle Test Pile project (WSF 2016).

Therefore, the harbor seal take estimate is based on local seal abundance information using the maximum number of seals (13) sighted in one day during the 2016 Seattle Test Pile project multiplied by a total of 113 pile driving days for the Seattle DOT Pier 62 Project. As a result, NMFS will authorize Level B harassment of 1,469 harbor seals that could be exposed to noise levels associated with “take.” Fifty-three of the 113 days of activity would involve installation by vibratory pile driving, which has a much larger Level A zone (306.8 m) than the Level A zones for vibratory removal (10.6 m) and impact pile driving (47.4 m). Harbor seals may be difficult to observe at greater distances, therefore, during vibratory pile driving, it may not be known how long a seal is present in the Level A zone. We estimate that four harbor seals

may experience Level A harassment during these 53 days. Four seals were considered to have the potential to be taken by Level A harassment based the local observational data for harbor seals, the larger ensonified area during vibratory pile driving for installation, and our best professional judgment that an animal would remain within the injury zone for prolonged exposure of intense noise. The number of Level B takes was adjusted to exclude those already counted for Level A takes, so the authorized Level B take is 1,465 harbor seals.

Table 6. Harbor Seal Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km²)	Level B ZOI (km²)	Days of Activity	Estimated Take Level A	Estimated Take Level B
1	1.219	0.000176	4.9	49	0	293
2	1.219	0.147853	91	53	10	5,879 (*Adjusted 5,869)
3	1.219	0.003529	2.3	11	0	31

Note:

km² – square kilometers

*Number of Level B takes was adjusted to exclude those already counted for Level A takes.

Northern Elephant Seal

Based on U.S. Navy species density estimates (U.S. Navy 2015), potential take of northern elephant seal is expected to be zero. However, The Whale Museum (as cited in WSDOT 2016a) reported one sighting in the relevant area between 2008 and 2014. Therefore, the Seattle DOT requested and NMFS will authorize Level B harassment of one northern elephant seal.

California Sea Lion

Based on U.S. Navy species density estimates (U.S. Navy 2015) for the inland waters of Washington, including Eastern Bays and Puget Sound, potential take of California sea lion is shown in Table 7. Since the calculated Level A zones of otariids are all very small (Table 5), we do not consider it likely that any sea lions would be taken by Level A harassment. All California

sea lion takes estimated here are expected to be takes by Level B harassment. The estimated Level B take is 644 California sea lions. However, the Seattle DOT believes that this estimate is unrealistically low, based on local marine mammal monitoring. Therefore, NMFS will authorize Level B harassment of 1,695 California sea lions. The California sea lion take estimate is based on four seasons of local sea lion abundance information from the EBSP. Marine mammal visual monitoring during the EBSP indicates that a maximum of 15 sea lions were observed in a day during four years of project monitoring (Anchor QEA 2014, 2015, 2016). Based on a total of 113 pile driving days for the Seattle Pier 62 project, it is estimated that up to 1,695 California sea lions could be exposed to noise levels associated with “take.”

Table 7. California Sea Lion Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km²)	Level B ZOI (km²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.1266	7.70E-13	4.9	49	0	30
2	0.1266	0.000726	91	53	0	611
3	0.1266	1.92423E-05	2.3	11	0	3

Note:
km² – square kilometers

Steller Sea Lion

Based on U.S. Navy species density estimates (U.S. Navy 2015), potential take of Steller sea lion is shown in Table 8. Since the calculated Level A zones of otariids are all very small (Table 5), we do not consider it likely that any Steller sea lions would be taken by Level A harassment. The Seattle DOT requested and NMFS will authorize Level B harassment of 188 Steller sea lions.

Table 8. Steller Sea Lion Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km ²)	Level B ZOI (km ²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.0368	7.70E-13	4.9	49	0	9
2	0.0368	0.000726	91	53	0	178
3	0.0368	1.92423E-05	2.3	11	0	1

Note:
km² – square kilometers

Southern Resident Killer Whale

Based on the U.S. Navy species density estimates (U.S. Navy 2015) the density for the SRKW is variable across seasons and across the range. The inland water density estimates vary from 0.001461 to 0.004760/km² in fall and 0.004761-0.020240/km² in winter. Therefore, the take request as shown in Table 9 is based on the highest density estimated during the winter season (0.020240/km²) for the SRKW population.

With the variable winter density, the Level B take estimate can range from 24 to 104 SRKW, with the upper take estimate greater than the estimated population size and the lower estimated take still greater than 20 percent of the population. NMFS will authorize Level B harassment of 24 SRKW based on a single occurrence of one pod (*i.e.*, J Pod – 24 individuals) that would be most likely to be seen near Seattle. The Seattle DOT will coordinate with the Orca Network and the Center for Whale Research (CWR) in an attempt to avoid all take of SRKW, but it may be possible that a group may enter the Level B ZOI before Seattle DOT could shut down due to the larger size of the Level B ZOI, particularly during vibratory pile driving (installation). Since the Level A zones of mid-frequency cetaceans are small (Table 5), we do not consider it likely that any SRKW would be taken by Level A harassment.

Table 9. Southern Resident Killer Whale Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km ²)	Level B ZOI (km ²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.020240	0.000004	4.9	49	0	5
2	0.020240	0.003139	91	53	0	98
3	0.020240	0.000016	2.3	11	0	1

Note:
km² – square kilometers

Transient Killer Whale

Based on U.S. Navy species density estimates (U.S. Navy 2015), potential take of transient killer whale is shown in Table 10. As with the SRKW, the density estimate of transient killer whales is variable between seasons and regions. In fall, density estimates range from 0.001583 to 0.002373/km² and in winter they range from 0.000575 to 0.001582/km². The winter density estimate, when most of the work is being conducted, will be used for estimating density and take. For Level B harassment, this results in a take estimate of eight individuals. However, the Seattle DOT believes that this estimate is low based on local data of seven transients that were reported in the area (Orca Network Archive Report 2016a). Therefore, NMFS will authorize Level B harassment of 42 transient killer whales, which would cover up to 2 groups of up to seven transient whales entering into the project area and remaining there for three days. Since the Level A zones of mid-frequency cetaceans are small (Table 5), we do not consider it likely that any transient killer whales would be taken by Level A harassment.

Table 10. Transient Killer Whale Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km ²)	Level B ZOI (km ²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.001582	0.000004	4.9	49	0	0
2	0.001582	0.003139	91	53	0	8
3	0.001582	0.000016	2.3	11	0	0

Note:

km² – square kilometers

Long-beaked Common Dolphin

Based on U.S. Navy species density estimates (U.S. Navy 2015), potential take of long-beaked common dolphin is expected to be zero. However, in 2016, the Orca Network (2016c) reported a pod of up to 20 long-beaked common dolphins. Therefore, the Seattle DOT requested and NMFS authorized Level B harassment of 20 long-beaked common dolphins. Since the Level A zones of mid-frequency cetaceans are all very small (Table 5), we do not consider it likely that the long-beaked common dolphin would be taken by Level A harassment.

Harbor Porpoise

Based on species density estimates from Jefferson *et al.* (2016), potential take of harbor porpoise is shown in Table 11. Take by Level A harassment is estimated at 32 harbor porpoises and take by Level B harassment is estimated at 3,512 exposures to harbor porpoises. NMFS will authorize take by Level A harassment of 32 harbor porpoises and take by Level B harassment of 3,480 harbor porpoises.

Table 11. Harbor Porpoise Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km ²)	Level B ZOI (km ²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.69	0.001037	4.9	49	0	166
2	0.69	0.875111	91	53	32	3,328 (*Adjusted 3,296)
3	0.69	0.017517	2.3	11	0	18

Note:

km² – square kilometers

*Number of Level B takes was adjusted to exclude those already counted for Level A takes. Take is instances not individuals.

Dall's Porpoise

Based on U.S. Navy species density estimates (U.S. Navy 2015), potential take of Dall's porpoise is shown in Table 12. Based on these calculations, the Seattle DOT requested and

NMFS will authorize take by Level A harassment of two Dall's porpoise and take by Level B harassment of 199 Dall's porpoise.

Table 12. Dall's Porpoise Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km²)	Level B ZOI (km²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.039	0.001037	4.9	49	0	10
2	0.039	0.875111	91	53	2	190 (*Adjusted 188)
3	0.039	0.017517	2.3	11	0	1

Note:

km² – square kilometers

*Number of Level B takes was adjusted to exclude those already counted for Level A takes.

Humpback Whale

Based on U.S. Navy species density estimates (U.S. Navy 2015), potential take of humpback whale is shown in Table 13. Although the standard take calculations would result in an estimated take of less than one humpback whale, to be conservative, the Seattle DOT requested and NMFS will authorize Level B harassment of five humpback whales based on take during previous work in Elliott Bay where two humpback whales were observed, including one take, during the 175 days of work during the previous four years (Anchor QEA 2014, 2015, 2016, and 2017). Since the Level A zones of low-frequency cetaceans are smaller during vibratory removal (17.4 m) or impact installation (88.6 m) compared to the Level A zone for vibratory installation (504.8 m) (Table 5), we do not consider it likely that any humpbacks would be taken by Level A harassment during removal or impact installation. We also do not believe any humpbacks would be taken during vibratory installation due to the ability to see humpbacks easily during monitoring and additional coordination with the Orca Network and the CWR which

would enable the work to be shut down before a humpback would be taken by Level A harassment.

Table 13. Humpback Whale Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km²)	Level B ZOI (km²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.00001	0.000476	4.9	49	0	0
2	0.00001	0.400275	91	53	0	0
3	0.00001	0.012331	2.3	11	0	0

Note:
km² – square kilometers

Gray whale

Based on U.S. Navy species density estimates (U.S. Navy 2015), potential take of gray whale is shown in Table 14. The Seattle DOT requested and NMFS will authorize Level B harassment of three gray whales. Since the Level A zones of low-frequency cetaceans are smaller during vibratory removal (17.4 m) or impact installation (88.6 m) compared to the Level A zone for vibratory installation (504.8 m) (Table 5), we do not consider it likely that any gray whales would be taken by Level A harassment during removal or impact installation. We also do not believe any gray whales would be taken during vibratory installation due to the ability to see gray whales easily during monitoring and additional coordination with the Orca Network and the CWR, which would enable the work to be shut down before a gray whale would be taken by Level A harassment.

Table 14. Gray Whale Estimated Take Based on NMSDD Presented for Comparison.

Sound Source	Species Density	Level A ZOI (km²)	Level B ZOI (km²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.00051	0.000476	4.9	49	0	0
2	0.00051	0.400275	91	53	0	3
3	0.00051	0.012331	2.3	11	0	0

Note:
km² – square kilometers

Minke Whale

Based on U.S. Navy species density estimates (U.S. Navy 2015), potential take of minke whales is expected to be zero (Table 15). However, between 2008 and 2014, the Whale Museum (as cited in WSDOT 2016a) reported one sighting in the relevant area. Although the take calculations would result in an estimated take of less than one minke whale, the Seattle DOT is requesting authorization for Level B harassment of two minke whales, based on previous sightings in the construction area by the Whale Museum. Based on the low probability that a minke whale would be observed during the project and then also enter into a Level A zone, we do not consider it likely that any minke whales would be taken by Level A harassment.

Table 15. Minke Whale Estimated Take Based on NMSDD Presented for Comparison.

Level B Zone	Species Density	Level A ZOI (km²)	Level B ZOI (km²)	Days of Activity	Estimated Level A Take	Estimated Level B Take
1	0.00003	0.000476	4.9	49	0	0
2	0.00003	0.400275	91	53	0	<1
3	0.00003	0.012331	2.3	11	0	0

Note:
km² – square kilometers

The summary of the authorized take by Level A and Level B Harassment is described below in Table 16.

Table 16. Summary of Requested Incidental Take by Level A and Level B Harassment

Species	Stock Size	Authorized Level A Take	Authorized Level B Take	Authorized Total Take	% of Population
Pacific harbor seal (<i>Phoca vitulina</i>)	11,036	4	1,465 ^a	1,469	13.31
Northern elephant seal (<i>Mirounga angustirostris</i>)	179,000	0	1 ^b	1	Less than 1
California sea lion (<i>Zalophus californianus</i>)	296,750	0	1,695 ^c	1,695	Less than 1
Steller sea lion (<i>Eumetopias jubatus</i>)	60,131- 74,448	0	188	188	Less than 1
Southern resident killer whale DPS (<i>Orcinus orca</i>)	78	0	24 (single occurrence of one pod) ^d	24 (single occurrence of one pod)	30.77
Transient killer whale (<i>Orcinus orca</i>)	240	0	42 ^e	42	20
Long-beaked common dolphin (<i>Dephinus capensis</i>)	101,305	0	20 ^f	20	Less than 1
Harbor porpoise (<i>Phocoena phocoena</i>)	11,233	32	3,480	3,512	31.26
Dall's porpoise (<i>Phocoenoides dalli</i>)	25,750	2	199	201	Less than 1
Humpback whale (<i>Megaptera novaengliae</i>)	1,918	0	5 ^g	5	Less than 1
Gray whale (<i>Eschrichtius robustus</i>)	20,990	0	3	3	Less than 1
Minke whale (<i>Balaenoptera acutorostrata</i>)	636	0	2 ^h	2	Less than 1

Note:

^a The take estimate is based on a maximum of 13 seals observed on a given day during the 2016 Seattle Test Pile project. The number of Level B takes was adjusted to exclude those already counted for Level A takes.

^b The take estimate is based on The Whale Museum (as cited in WSDOT 2016a) reporting one sighting of a Northern elephant seal in the area between 2008 and 2014.

^c The take estimate is based on a maximum of 15 California sea lions observed on a given day during 4 monitoring seasons of the EBSP project.

^d The take estimate is based on a single occurrence of one pod of SRKW (*i.e.*, J-pod of 24 SRKW) that would be most likely to be seen near Seattle.

^e The take estimate is based on local data which is greater than the estimates produced using the Navy density estimates. Therefore, the take is 20 percent of the transient killer whale stock.

^f The take estimate is based on the Orca Network (2016c) reporting a pod of up to 20 long-beaked common dolphins.

^g The take estimate is based on take during previous work in Elliott Bay, where two humpback whales were observed and is greater than what was calculated using 2015 Navy density estimates.

^h The take estimate is based on The Whale Museum (as cited in WSDOT 2016a) reporting one sighting in the relevant area. Although the take calculations would result in an estimated take of less than one minke whale, to be conservative the Seattle DOT is requesting take of two minke whales.

Mitigation

In order to issue an IHA under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, “and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking” for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

1) the manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned) the likelihood of effective implementation (probability implemented as planned), and;

2) the practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Several measures for mitigating effects on marine mammals from the pile installation and removal activities at Pier 62 and are described below.

Timing Restrictions

All work will be conducted during daylight hours.

Bubble Curtain

A bubble curtain will be used during pile driving activities with an impact hammer to reduce sound levels.

Exclusion Zones

Exclusion Zones will be implemented to protect marine mammals from Level A harassment (Table 17 below). The PTS isopleths described in Table 5 were used as a starting point for calculating the exclusion zones; however, Seattle DOT will implement a minimum shutdown zone of a 10 m radius around each pile for all construction methods for all marine mammals. Therefore, in some cases the exclusion zone will be slightly larger than was calculated for the PTS isopleths as described in Table 5 (*i.e.*, for mid-frequency cetaceans and otariid pinnipeds). Outside of any Level A take authorized, if a marine mammal is observed at or within the Exclusion Zone, work will shut down (stop work) until the individual has been observed outside of the zone, or has not been observed for at least 15 minutes for pinnipeds and small cetaceans and 30 minutes for large whales.

Table 17. Exclusion zones for various pile driving activities for marine mammal hearing groups.

Sound Source Type	Exclusion Zone (meters)				
	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
1 - Vibratory (pile removal)	17.4	10	25.7	10.6	10
2 - Vibratory (installation)	504.8	44.7	746.4	306.8	21.5
3 - Impact (installation)	88.6	10	105.6	47.4	10

Additional Shutdown Measures

Seattle DOT will implement shutdown measures if the cumulative total number of individuals observed within the Level B harassment zone for any particular species reaches the number authorized under the IHA and if such marine mammals are sighted within the vicinity of the project area and are approaching the Level B harassment zone during in-water construction activities.

Level B Harassment Zones

Seattle DOT will monitoring the Level B harassment zones as described in Table 18.

Table 18. Level B Harassment Zones for various pile driving activities

Activity	Construction Method	Level B Threshold (m)	Level B ZOI (km ²)
Removal of 14-in Timber Piles	Vibratory	1,865	4.9
Installation of 30-in Steel Piles	Vibratory	54,117	91
Installation of 30-in Steel Piles	Impact	1,201	2.3

Soft-Start for Impact Pile Driving

Each day at the beginning of impact pile driving or any time there has been cessation or downtime of 30 minutes or more without pile driving, Seattle DOT will use the soft-start technique by providing an initial set of three strikes from the impact hammer at 40 percent energy, followed by a one-minute waiting period, then two subsequent three-strike sets.

Additional Coordination

The project team will monitor and coordinate with local marine mammal networks on a daily basis (*i.e.*, Orca Network and/or the CWR) for sightings data and acoustic detection data to gather information on the location of whales prior to pile removal or pile driving activities. The project team will also coordinate with WSF to discuss marine mammal sightings on days when pile driving and removal activities are occurring on their nearby projects. Marine mammal monitoring will be conducted to collect information on the presence of marine mammals within the Level B Harassment Zones for this project. In addition, reports will be made available to interested parties upon request. With this level of coordination in the region of activity, Seattle DOT will get real-time information on the presence or absence of whales before starting any pile driving or removal activities.

Based on our evaluation of the applicant's mitigation measures, as well as other measures considered by NMFS, NMFS has determined that the mitigation measures provide the means of effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an IHA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth, "requirements pertaining to the monitoring and reporting of such taking."

The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density).
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas).
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors.
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks.
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat).

- Mitigation and monitoring effectiveness.

Marine mammal monitoring will be conducted at all times during in-water pile driving and pile removal activities in strategic locations around the area of potential effects as described below:

- During pile removal or installation with a vibratory hammer, three to four monitors would be used, positioned such that each monitor has a distinct view-shed and the monitors collectively have overlapping view-sheds.
- During pile driving activities with an impact hammer, one monitor, based at or near the construction site, will conduct the monitoring.
- In the case(s) where visibility becomes limited, additional land-based monitors and/or boat-based monitors may be deployed.
- Monitors will record take when marine mammals enter the relevant Level B Harassment Zones based on type of construction activity.
- If a marine mammal approaches an Exclusion Zone, the observation will be reported to the Construction Manager and the individual will be watched closely. If the marine mammal crosses into an Exclusion Zone, a stop-work order will be issued. In the event that a stop-work order is triggered, the observed marine mammal(s) will be closely monitored while it remains in or near the Exclusion Zone, and only when it moves well outside of the Exclusion Zone or has not been observed for at least 15 minutes for pinnipeds and small cetaceans and 30 minutes for large whales will the lead monitor allow work to recommence.

Protected species observers

Seattle DOT shall employ NMFS-approved protected species observers (PSOs) to conduct marine mammal monitoring for its Pier 62 Project. The PSOs will observe and collect data on marine mammals in and around the project area for 30 minutes before, during, and for 30 minutes after all pile removal and pile installation work. NMFS-approved PSOs shall meet the following requirements:

1. Independent observers (*i.e.*, not construction personnel) are required.
2. At least one observer must have prior experience working as an observer.
3. Other observers may substitute education (undergraduate degree in biological science or related field) or training for experience.
4. Where a team of three or more observers are required, one observer should be designated as lead observer or monitoring coordinator. The lead observer must have prior experience working as an observer.
5. NMFS will require submission and approval of observer CVs.
6. PSOs will monitor marine mammals around the construction site using high-quality binoculars (*e.g.*, Zeiss, 10 x 42 power) and/or spotting scopes. Due to the different sizes of the Level B Zones from different pile sizes, several different Level B Zones and different monitoring protocols corresponding to a specific pile size will be established.
7. If marine mammals are observed, the following information will be documented:
 - (A) Date and time that monitored activity begins or ends;
 - (B) Construction activities occurring during each observation period;
 - (C) Weather parameters (*e.g.*, percent cover, visibility);
 - (D) Water conditions (*e.g.*, sea state, tide state);

- (E) Species, numbers, and, if possible, sex and age class of marine mammals;
- (F) Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from pile driving activity;
- (G) Distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;
- (H) Locations of all marine mammal observations; and
- (I) Other human activity in the area.

Acoustic Monitoring

In addition, acoustic monitoring will occur on up to six days per in-water work season to evaluate, in real time, sound production from construction activities and will capture all hammering scenarios that may occur under the planned project. Background noise recordings (in the absence of pile-related work) will also be made during the study to provide a baseline background noise profile. Acoustic monitoring will follow NMFS's 2012 Guidance Documents: Sound Propagation Modeling to Characterize Pile Driving Sounds Relevant to Marine Mammals and Data Collection Methods to Characterize Underwater Background Sound Relevant to Marine Mammals in Coastal Nearshore Waters and Rivers of Washington and Oregon.

The results and conclusions of the acoustic monitoring will be summarized and presented to NOAA/NMFS with recommendations on any modifications to this plan or Exclusion Zones.

Reporting Measures

Marine Mammal Monitoring Report

Seattle DOT will submit a draft marine mammal monitoring report within 90 days after completion of the in-water construction work or the expiration of the IHA (if issued), whichever comes earlier. The report would include data from marine mammal sightings as described: date, time, location, species, group size, and behavior, any observed reactions to construction, distance to operating pile hammer, and construction activities occurring at time of sighting and environmental data for the period (*i.e.*, wind speed and direction, sea state, tidal state, cloud cover, and visibility). The marine mammal monitoring report will also include total takes, takes by day, and stop-work orders for each species. NMFS will have an opportunity to provide comments on the report, and if NMFS has comments, Seattle DOT will address the comments and submit a final report to NMFS within 30 days.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA, such as an injury (Level A harassment), serious injury, or mortality, Seattle DOT would immediately cease the specified activities and immediately report the incident to the Permits and Conservation Division, Office of Protected Resources, NMFS and the NMFS' West Coast Stranding Coordinator. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hrs preceding the incident;
- Water depth;

- Environmental conditions (*e.g.*, wind speed and direction, sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hrs preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the prohibited take. NMFS would work with Seattle DOT to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Seattle DOT may not resume their activities until notified by NMFS via letter, email, or telephone.

Reporting of Injured or Dead Marine Mammals

In the event that Seattle DOT discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition as described in the next paragraph), Seattle DOT will immediately report the incident to the Permits and Conservation Division, Office of Protected Resources, NMFS and the NMFS' West Coast Stranding Coordinator. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS would work with Seattle DOT to determine whether modifications in the activities are appropriate.

In the event that Seattle DOT discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced

decomposition, or scavenger damage), Seattle DOT will report the incident to the Permits and Conservation Division, Office of Protected Resources, NMFS and the NMFS Stranding Hotline and/or by email to the NMFS' West Coast Stranding Coordinator within 24 hrs of the discovery. Seattle DOT would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS. Activities may continue while NMFS reviews the circumstances of the incident.

Acoustic Monitoring Report

Seattle DOT will submit an Acoustic Monitoring Report within 90 days after completion of the in-water construction work or the expiration of the IHA (if issued), whichever comes earlier. The report will provide details on the monitored piles, method of installation, monitoring equipment, and sound levels documented during both the sound source measurements and the background monitoring. NMFS will have an opportunity to provide comments on the report or changes in monitoring for the second season, and if NMFS has comments, Seattle DOT will address the comments and submit a final report to NMFS within 30 days. If no comments are received from NMFS within 30 days, the draft report will be considered final. Any comments received during that time will be addressed in full prior to finalization of the report.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival” (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone

is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be “taken” through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS’s implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

No serious injury or mortality is anticipated or authorized for the Pier 62 Project. Takes that are anticipated and authorized are expected to be limited to short-term Level A and Level B harassment (behavioral). Marine mammals present in the vicinity of the action area and taken by Level A and Level B harassment would most likely show overt brief disturbance (startle reaction) and avoidance of the area from elevated noise levels during pile driving and pile removal and the implosion noise. However, many marine mammals showed no observable changes during similar project activities for the EBSP.

There are two endangered species that may occur in the project area, humpback whales and SRKW. However, few humpbacks are expected to occur in the project area and few have been observed during previous projects in Elliot Bay. SRKW have occurred in small numbers in the project area. Seattle DOT will shut down in the Level B ZOI should they meet or exceed the take of one occurrence of one pod (J-pod, 24 whales).

There is ESA-designated critical habitat in the vicinity of Seattle DOT's Pier 62 Project for SRKW. However, this IHA is authorizing the harassment of marine mammals, not the production of sound, which is what would result in adverse effects to critical habitat for SRKW. There is one documented harbor seal haulout area near Bainbridge Island, approximately 6 miles (9.66 km) from Pier 62. The haulout, which is estimated at less than 100 animals, consists of intertidal rocks and reef areas around Blakely Rocks and is at the outer edge of potential effects at the outer extent near Bainbridge Island (Jefferies *et al.* 2000). The level of use of this haulout during the fall and winter is unknown, but is expected to be much less than in the spring and summer, as air temperatures become colder than water temperatures resulting in seals in general hauling out less. Similarly, the nearest Steller sea lion haulout to the project area is located approximately 6 miles away (9.66 km) and is also on the outer edge of potential effects. This haulout is composed of net pens offshore of the south end of Bainbridge Island.

The project also is not expected to have significant adverse effects on affected marine mammal habitat, as analyzed in the "Potential Effects of Specified Activities on Marine Mammals and their Habitat" section. Project activities would not permanently modify existing marine mammal habitat. The activities may kill some fish and cause other fish to leave the area temporarily, thus impacting marine mammals' foraging opportunities in a limited portion of the foraging range; but, because of the short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences. Therefore, given the consideration of potential impacts to marine mammal prey species and their physical environment, Seattle DOT's Pier 62 Project would not adversely affect marine mammal habitat.

In summary and as described above, the following factors primarily support our determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No serious injury or mortality is anticipated or authorized.
- Takes that are anticipated and authorized are expected to be limited to short-term Level B harassment (behavioral) and a small number of takes of Level A harassment (behavioral) for three species.
- The project also is not expected to have significant adverse effects on affected marine mammals' habitat.
- There are no known important feeding or pupping areas. There are two haulouts (harbor seals and Steller sea lions). However, they are at the most outer edge of the potential effects and approximately 6.6 miles from Pier 62. There are no other known important areas for marine mammals.
- For eight of the eleven species, take is less than one percent of the stock abundance. Instances of take for the other three species (harbor seals, killer whales, and harbor porpoise) range from about 13-31 percent of the stock abundance. However, when the fact that a fair number of these instances are expected to be repeat takes of the same animals is considered, the number of individual marine mammals taken is significantly lower.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the monitoring and mitigation measures, NMFS finds that the total marine mammal take from the planned activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under Section 101(a)(5)(D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. Additionally, other factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Take of eight of the eleven species is less than one percent of the stock abundance. Instances of take for the SRKW and transient killer whales, harbor seals, and harbor porpoise ranges from about 13-31 percent of the stock abundance. However, when the fact that a fair number of these instances are expected to be repeat takes of the same animals is considered, the number of individual marine mammals taken is significantly lower. Specifically, for example, Jefferson *et al.* 2016 conducted harbor porpoise surveys in eight regions of Puget Sound, and estimated an abundance of 147 harbor porpoise in the Seattle area (1,798 porpoise in North Puget Sound and 599 porpoise in South Puget Sound). While individuals do move between regions, we would not realistically expect that 3000+ individuals would be exposed around the pile driving for the Seattle DOT's Pier 62 Project. Considering these factors, as well as the general small size of the project area as compared to the range of the species affected, the numbers of marine mammals estimated to be taken are small proportions of the total populations of the affected species or stocks. Further, for SRWK we acknowledge that 30.77% of the stock is authorized to be taken by Level B harassment, but we believe that a single, brief incident of take of one group of any species represents take of small numbers for that species. Based on the analysis contained

herein of the planned activity (including the mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS finds that small numbers of marine mammals will be taken relative to the population sizes of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act (ESA)

Section 7(a)(2) of the ESA of 1973 (16 U.S.C. § 1531 *et seq.*) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally, in this case with the West Coast Regional Office (WCRO), whenever we propose to authorize take for endangered or threatened species.

The Permit and Conservation Division consulted under of section 7 of the ESA with the WCRO for the issuance of this IHA. The WCRO concluded that the actions are not likely to jeopardize the continued existence of SRKW and humpback whales will not result in the destruction or adverse modification of designated critical habitat. NMFS will authorize take of SRKW and humpback whales, which are listed under the ESA.

Authorization

NMFS has issued an IHA to the Seattle DOT for the harassment of small numbers of marine mammals incidental to pile driving and removal activities for the Pier 62 Project within

Elliot Bay, Seattle, Washington from October 2017 to February 2018, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: October 4, 2017.

Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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